train of pathological events we are still largely at sea in appreciating fully what has taken place. One of these unusual events is the occasional organization taking the place of the more common complete resolution. For some reason the lung parenchyma responds to an irritant in a manner not unusually observed in pneumococcus pneumonia. WADSWORTH (*Jour. Med. Res.*, 1918, xxix, 147) undertook an experimental research attempting to reproduce the condition found in the human. He made use of dogs, using the Meltzer method for the production of pneumonia. A number of animals were infected with the pneumococcus. None of these showed evidence of organization. Another series of animals was infected with the Staphylococcus aureus. These animals developed bronchopneumonic lesions in which resolution was delayed and the beginning of abscess formation observed. The third series of animals received a mixture of pneumococcus and staphylococcus. By these means it was hoped to obtain more extensive lobar lesions by the pneumococcus which might favor the activity of the staphylococcus with delayed resolution and organization. Difficulty was experienced in ganging the proper dosage and many of the experiments were negative. Two animals, however, killed on the fifteenth and nineteenth day, showed irregular areas of consolidation around the bronchi, partly acute and partly unresolved with early organization. The experiments indicate that the pneumococcus will give rise to unresolved pneumonia with organization only in the presence of a complicating or secondary infection. It is possible that with certain organisms constituting the secondary infection a symbiosis with the pneumococcus is necessary to permit them inducing the proper grade of reaction whereby organization results. It is of course also to be remembered that there may be other bacteria acting in pure culture which may produce types of organizing pneumonia, as has been suggested by MacCallum and Cole, as for instance the pulmonary streptococcus infection following measles.

HYGIENE AND PUBLIC HEALTH

UNDER THE CHARGE OF

MILTON J. ROSENAU, M.D.,

PROFESSOR OF PREVENTIVE MEDICINE AND HYGIENE, HARVARD MEDICAL SCHOOL, BOSTON, MASSACHUSETTS,

AND

GEORGE W. McCOY, M.D.,

DIRECTOR OF HYGIENIC LABORATORY, UNITED STATES PUBLIC HEALTH SERVICE, WASHINGTON, D. C.

Safe Limit of Carbon Dioxide in the Working Atmosphere.—HIGLEY (*Am. Jour. Public Health*, July, 1918) states that in the opinion of Flügge one may breathe for several hours air containing twenty times the usual permissible percentage of carbon dioxide without perceptible deleterious influence upon his health. The more rigorous methods of the New York State Commission for Ventilation reveal

the fact that stagnant air containing two to fifteen times the generally accepted amount of carbon dioxide may be respired seven hours per day for five or more weeks with no perceptible effect upon heart-rate, on increase of heart-rate on standing, on blood-pressure, Crampton value or respiration of the subject. On the other hand, all the deleterious effects that were formerly attributed to respiring carbon dioxide present in the stagnant air may be produced by breathing, for the same period, air that is practically free from carbon dioxide but which has a temperature of say 90° F. and a very high relative humidity. Also that a cold, dry air when heated to 80° or more without humidification may produce, when respired for some time, the deleterious results so beautifully demonstrated by Cooks. The matter is well summed up by Professor Lee when he says that "the problem of ventilation is physical rather than chemical, cutaneous rather than respiratory." In view of the fact that recent investigations have apparently shown carbon dioxide to be harmless when respired in much larger amounts than 0.08 per cent., the writer suggests that the safe limit of this gas in the working atmosphere be placed at 0.2 per cent.

Sterilization of Woollen Blankets and Uniforms.—FULTON and STANIFORD (*Jour. Am. Med. Assn.*, September 7, 1918, p. 823) state that the following procedures effectively sterilize woollen goods without deterioration or shrinkage: Woollen blankets or uniforms are placed on hangers or loosely on the trays in the sterilizer. Sixty pounds of steam is introduced into the outer jacket of the sterilizer to prevent subsequent condensation of steam within the sterilizing chamber. A vacuum of from fifteen to twenty inches is created in the sterilizer chamber to facilitate penetration of the clothing by steam. Sterilization is performed with either 0 pounds of steam for one hour, designated as the atmospheric pressure method, or 12 pounds of steam for ten minutes, designated as the pressure method. Again a vacuum of from fifteen to twenty inches is produced to facilitate drying. The door of the sterilizer is opened about four inches for ten minutes to allow gradual cooling of the contents of the sterilizer.

Studies in Bovine Mastitis. II. The Relation of Hemolytic Streptococci to Udder Infections.—JONES (*Jour. Exper. Med.*, September 1, 1918) states that hemolytic streptococci produce more or less severe inflammations of the udders of cows. Frequently infected quarters are swollen, firm, hot and tender. In a number of instances it has not been possible to detect gross changes in the mammary gland. While invasion of the udder with hemolytic streptococci has not been observed so frequently as infections with non-hemolytic types, nevertheless serious losses occur from these infections. Of nineteen cows under observation for an extended period, only four recovered. The udder may become invaded at any time during the lactation period. Doubtless the principal method of entrance is through the teat canal. Injuries play only a minor part as a predisposing factor. Animals suffering from mastitis in one quarter associated with hemolytic streptococci frequently shed identical streptococci in the milk from other quarters. Often the organisms are in pure culture or make up the bulk of the flora of that quarter. These invasions rarely produce gross changes in the gland

and frequently fail to change the character of the milk. Cows affected in this way are of considerable danger to other animals in the herd. The milker is usually warned of the infectious nature of the secretions of the diseased quarter, but may be careless in handling milk from apparently normal quarters. This may explain one ready source of infection. The pathogenicity of hemolytic streptococci obtained from cases of mastitis to species other than bovines is undetermined. Raw milk from large dairies must contain a considerable number of these organisms. Usually only the milk from clinically affected quarters is discarded, but the secretion from the other quarters not visibly involved which often contains large numbers of streptococci enters the milk supply. If any considerable number of these organisms were pathogenic for consumers of milk, septic sore-throat would occur with considerable frequency; nevertheless, milk containing a few flocculi and hemolytic streptococci obtained from cows which fail to show gross lesions must be looked upon with suspicion until more is known of the source and nature of the virus.

Attempts to Induce Poliomyelitis in Small Laboratory Animals.—STIMSON (*Hygienic Laboratory Bulletin*, No. 111, p. 31) states that no evidence was adduced by his experiments to show that rabbits, guinea-pigs or rats are susceptible to poliomyelitis. Other observers have reported the successful infection of rabbits and guinea-pigs with poliomyelitis virus. Their methods did not differ essentially from those employed by Stimson. The discrepancy, therefore, must be attributed to one or the other of two causes, according to Stimson: either the strain or virus employed by these observers differs from his in its pathogenic properties or it is contaminated with some organism capable of producing these symptoms in small animals.

Epidemiological Studies of Poliomyelitis in New York City and the Northeastern United States During the Year 1916.—LAVINDER, FREEMAN and FROST (*Public Health Bulletin* No. 91, July, 1918) state that poliomyelitis is, in nature, exclusively a human infection, transmitted from person to person without the necessary intervention of a lower animal or insect host, the precise mechanism of transmission and avenues of infection being undetermined. The infection is far more prevalent than is apparent from the incidence of clinically recognized cases, since a large majority of persons infected become "carriers" without clinical manifestations. It is probable that during an epidemic such as that in New York City a very considerable proportion of the population become infected, adults as well as children. The most important agencies in disseminating the infection are the unrecognized carriers and perhaps mild abortive cases ordinarily escaping recognition. It is fairly certain that the frank, paralytic cases are a relatively minor factor in the spread of infection. An epidemic of one to three recognized cases per thousand, or even less, immunizes the general population to such an extent that the epidemic declines spontaneously, due to the exhaustion or thinning out of infectable material. Apparently an epidemic incidence relatively small in comparison to that prevailing in an epidemic may produce a population immunity sufficient to definitely limit the incidence rate in a subsequent epidemic. It is, of course,

to be expected that further experimental and epidemiological research will modify this view and will more fully explain all the phenomena of this disease. It may, however, be noted that other more common infectious diseases, generally considered "familiar," present problems as little explained as those of poliomyelitis and that broader studies of these diseases may be expected to assist in interpreting some of the facts established regarding poliomyelitis.

A Clinical Study of the Frequency of Lead, Turpentine and Benzine Poisoning in Four Hundred Painters.—HARRIS (*Arch. Int. Med.*, August, 1918, xxii, 129–156) undertook this study to obtain a more concise idea of the extent to which actively employed workers, most of whom thought themselves in excellent health, gave evidences of damage inflicted by lead paints. One hundred and sixty-three, a rate of prevalence of 40 per cent., of active cases of lead poisoning were found among the 402 painters examined. All of these showed definite clinical signs of plumbism; 72, or 44 per cent., of the active cases of lead poisoning among these painters were found to have lead in the urine in addition to clinical evidence. Thirty-five, or 8.7 per cent., of the total number were found to have lead in their urine without manifest clinical signs. In other words, nearly one-half of all the painters examined, or 48.7 per cent., gave evidence of active or latent lead poisoning. No attempt was made to distinguish between the effects of turpentine, benzine, wood alcohol, acetone, benzol, etc. At least 70 per cent. of all those examined gave a fairly clear and recognizable history of at least one or many attacks, and 142 painters gave a history of recent severe intoxication, in which several or even all of the following symptoms were noted: a sudden sense of weakness in the legs, irritation of the eyes, difficulty in breathing and dryness and irritation of the throat, cough, headache and dizziness, which in a number of cases was so pronounced that frequently a history of falls from scaffolding or ladders was obtained. In addition, there were often present nausea, vomiting, painful and frequent urination during the day, a few cases of bloody diarrhea, and several others of bloody urine. Practically 60 per cent. of the recent cases of turpentine and the related type of intoxications were found among our 163 active and 35 latent lead-poisoning cases out of the total of 402. Forty-seven of the 142 recent cases had suffered from frequent and moderately painful urination. Occasionally, symptoms that indicated strangury with bloody urine were described. Twenty-three of this group complained of frequent attacks of vertigo. A comparatively small number survive as active members of the trade after having attained the age of fifty years. Also, 64 per cent. of the active cases of lead poisoning occurred between the ages of thirty and forty-nine years, whereas 71, or 45 per cent., of all those who apparently were free from symptoms of plumbism were less than thirty years of age. Taken in connection with the fact that most painters enter the trade before their twentieth year, and, being skilled workers, follow it the rest of their lives, and, furthermore, that of the 109 who were more than forty years of age 59 per cent. were found to be suffering from active or latent plumbism, it seems fair to conclude that the action of lead is slow in asserting itself, but that less than half who have passed the age of forty years escape the disease. The remedial measures

that suggest themselves may be divided into two general classes: (1) public health measures, contained in better sanitary conditions for the workers, (2) and instruction in personal hygiene as applicable to the trade.

The Virulence of the Tubercle Bacilli Isolated from the Sputum.—Conper (*Jour. Infect. Dis.*, December, 1918, No. 6, xxiii, 493) states that it is rather singular that the tubercle bacillus was one of the first pathogenic microörganisms isolated in pure culture, and yet its virulence in the sputum, the most important route of exit from the body in man, has been studied only in an unsatisfactory manner considered from a hygienic and sanitary standpoint. He isolated tubercle bacilli by Petroff's method from the sputum of 90 cases of pulmonary tuberculosis in man, of which 8 were incipient, 20 moderately advanced and 62 far advanced. The bacilli in 88 of these cases were of the human variety. Of these 88 cultures examined for virulence to guinea-pig (by subcutaneous injection), 86 proved to be virulent in amounts of 0.000,001 mg., 10 of these were not examined below this amount and 66 produced tuberculosis (beyond the local glands) in guinea-pigs within two months in 0.000,000,01 mg. amounts. One of the two low virulent tubercle bacilli only produced a slight tuberculosis in guinea-pigs in 0.001 mg. amounts within two months, while the other produced no tuberculosis beyond the local involvement even in 1 mg. amounts. No relation was observed between the virulence of the human tubercle bacilli for the guinea-pigs and rabbits and the rapidity of the disease in man. No appreciable difference, within the limits of error of the experiments, between the virulence of human tubercle bacilli tested by subcutaneous injection for young (four months) and mature (one year) male guinea-pigs was noted sixty-two days after infection. Human tubercle bacilli isolated on Petroff's medium do not appreciably alter their virulence for a period of one to three months as tested in guinea-pigs, provided no detrimental influences are introduced. A second seeding on Petroff's medium within this time produces bacilli of equal virulence to guinea-pigs to the primary. Treatment of human tubercle bacilli with 3 per cent. NaOH solution for one hour at 37° C. does not appreciably affect the virulence of the bacilli for guinea-pigs, while 6 per cent. NaOH for one hour at 37° C. will destroy the virulence of some cultures. The test for virulence of human tubercle bacilli isolated from the sputum of the same patient at different intervals (one and three months) gives concordant results in guinea-pigs.

Botulism.—Dickson (*Arch. Int. Med.*, October, 1918, xxii, 483-495) concludes from his studies that the use of home-canned foods is not wholly unattended with danger. Various methods of canning were adopted and were followed as carefully as it is possible to have untrained persons conduct technical procedures. He states that the fact that in several instances the greater part of the home-canned material remained in good condition simply proves that though the methods are efficient in preventing ordinary spoilage, they are inefficient if the raw material happens to be contaminated with spores of B. botulinus. It is essential that only freshly picked raw material should be used for canning and it should be blanched before it is placed in jars. One outbreak showed

clearly that three hours' sterilization in the washboiler was not sufficient to kill spores of B. botulinus in vegetables which had been freshly picked and had been boiled for twenty minutes in an open kettle before being packed into 1-pint jars, a procedure which should be at least as efficient as simple blanching. Dickson further states that it is unsafe to eat or even taste home-canned products before they have been boiled. It is well known that the toxin of B. botulinus is quickly destroyed by heat. It is of the utmost importance that those who are directing the home-canning industry should recognize that the present methods of home-canning are not entirely safe, especially in the hands of untrained workers. If they will but admit this fact and will instruct the public that there is possible danger of poisoning from home-canned products, and that the danger may be averted if all home-canned food is boiled before it is eaten or even tasted, outbreaks of botulism from home-canned products will entirely cease.

Reliability of Ozone in Swimming Pool Disinfection.—MANHEIMER (*Jour. Am. Med. Assn.*, June 29, 1918, lxx, 1991–1992) recommends ozone for swimming pool purification for the following reasons: (1) It is reliable as a disinfectant; (2) it is capable of purifying heavily polluted pool water; (3) it produces no objectionable substances in the water; (4) it improves the appearance and transparency of the water, permitting a longer continued use of the pool, a consequent reduction in the cost of maintenance, and a reduction in the hazard of drowning; (5) it is inexpensive in application.

Experimental Scurvy of Guinea-pig in Relation to Diet.—COHEN and MENDEL (*Jour. Biol. Chem.*, September, 1918, xxxv, No. 3) state that experimental scurvy of guinea-pig may be demonstrated at will with suitably chosen diets. Exclusive diets of cereal grains like oats and barley produce the disease. Germinated oats or barley prevent the appearance of scurvy even when fed for comparatively long periods. Scurvy arises on a diet of soy-bean flour, even when the latter is supplemented with fat soluble and water soluble vitamines, inorganic salts and cellulose. Small additions of raw milk do not prevent the onset of scurvy. Larger quantities cause the symptoms to disappear. Roughage in the diet plays, if anything, a minor necessary role in the prevention of scurvy. This disease is not essentially dependent on constipation as a causative factor, though the latter may aggravate the symptoms. Cabbage seems to retain some antiscorbutic properties even when dried. Contrary to current statements, highly purified lactose, fed with a scurvy-producing diet appears to have no effect on the course of the disease.

Notice to Contributors.—All communications intended for insertion in the Original Department of this JOURNAL are received only *with the distinct understanding that they are contributed exclusively to this* JOURNAL.

Contributions from abroad written in a foreign language, if on examination they are found desirable for this JOURNAL, will be translated at its expense.

A limited number of reprints in pamphlet form, if desired, will be furnished to authors, *providing the request for them be written on the manuscript.*

All communications should be addressed to—

DR. GEORGE MORRIS PIERSOL, 1913 Spruce St., Philadelphia, Pa., U. S. A.